

ADAPTIVE MANAGEMENT IMPLEMENTATION PLAN

Section 1. Contacts

1. Date submitted March 11, 2008	2. Region 5	3. Regional Biologist Jan Taylor
4. Refuge Supervisor Janet Kennedy	5. Refuge/Station Name Parker River, Rachel Carson, Rhode Island, Eastern Massachusetts NWRs	6. Station Project Leaders Graham Taylor, Ward Feurt, Charlie Vandemoer, Libby Herland Signatures: (see cover page)
7. Contact person Nancy Pau (main contact), Kate O'Brien, Suzanne Paton, Stephanie Koch	8. Contact phone number 978-465-5753 x211	9. Brief title Management of shrub habitats to support high priority species

10. Biological Monitoring Team Contacts

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Section 2. Synopsis of adaptive management workshop

11. Date & location of workshop: January 9-10, 2008 at Parker River NWR, Newburyport, MA

12. Workshop Participants, including Refuge staff.

The list of invited participants, their representative agencies and whether they were ultimately able to attend is as follows:

Participants	Agency	E-mail / phone number / notes	Attend (y/n)
FACILITATORS-			
Melinda Knutson	FWS, BMT - facilitator	Melinda_Knutson@fws.gov	Y
Anne Hecht	FWS co-facilitator	Anne_Hecht@fws.gov	Y
Jennifer Casey	FWS assist facilitator	Jennifer_Casey@fws.gov	Y
Jan Taylor	FWS, RO	Jan_D_Taylor@fws.gov	Y
Hal Laskowski	FWS, RO	Harold_Laskowski@fws.gov	Y
PARTICIPATING REFUGES			
Nancy Pau (lead) (biologist)	FWS, Parker River	Nancy_Pau@fws.gov	Y
Kate O'Brien (biologist)	FWS, Rachel Carson	Kate_O'Brien@fws.gov	Y
Suzanne Paton (biologist)	FWS, Rhode Island	Suzanne_Paton@fws.gov	Y
Stephanie Koch (biologist)	FWS, Eastern Mass.	Stephanie_Koch@fws.gov	Y
Mark Maghini (Manager)	FWS, Rhode Island	Mark_Maghini@fws.gov	Y
Graham Taylor (Manager)	FWS, Parker River	Graham_Taylor@fws.gov	Y
Ward Feurt (Manager)	FWS, Rachel Carson	Ward_Feurt@fws.gov	Y
ADAPTIVE MANAGEMENT EXPERT			
Paul Conn	NOAA,	Paul.Conn@noaa.gov	Y

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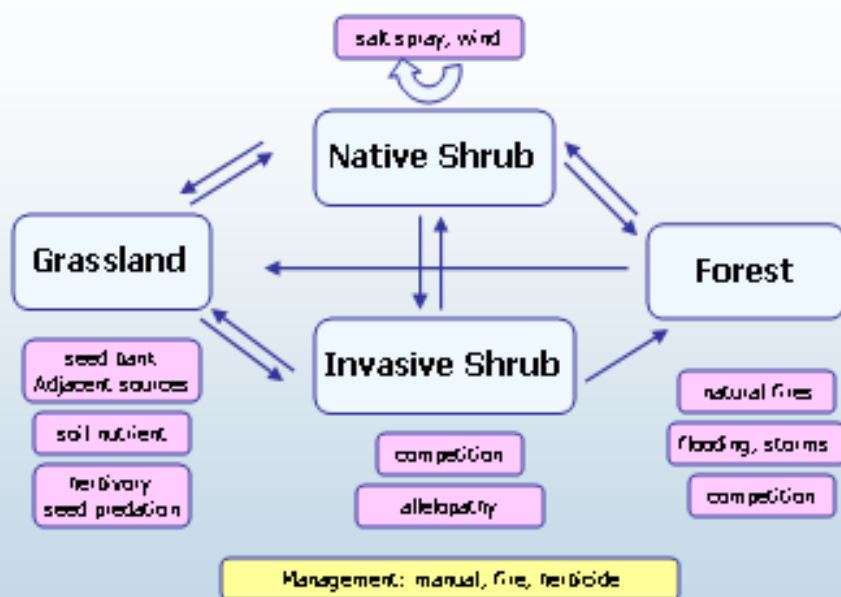
HABITAT EXPERTS			
Tim Simmons	MA NHESP	tim.simmons@state.ma.us	Y
Laura Mitchell	FWS fire expert	Laura_mitchell@fws.gov	no
Leslie Sneddon	NatureServe	lesley_sneddon@natureserve.org	Y
Chris Mattrick	U.S. Forest Service	cmatrick@fs.fed.us	Y
Mariko Yamasaki	US Forest Service	myamasaki@fs.fed.us	Y
Franz Ingelfinger	Trustees of Reservation	fingelfinger@ttor.org	Y
N.E. COTTONTAIL EXPERTS			
John Litvaitis	U New Hampshire - NEC	john@unh.edu	Y
Anthony Tur	FWS	Anthony_tur@fws.gov	Y
Rick Bennett	FWS	Rick_Bennett@fws.gov	no
Jim Oehler	NH Fish & Game	joehler@wildlife.state.nh.us - shrub habitat also	Y
BIRD EXPERTS			
Randy Dettmers	FWS, Mig Birds	Randy_Dettmers@fws.gov	Y
Mitch Hartley	FWS, Mig Birds	Mitch_Hartley@fws.gov	Y
Jill Liske-Clark	State of MA	Jill.Liske-Clark@state.ma.us	no
Scott McWilliams	Univ. RI	srmcwilliams@uri.edu	no
David King	USFS/UMass Amherst	http://www.fs.fed.us/ne/durham/4155/yamasaki.htm	no
Chris Norment	Brockport University	cnorment@brockport.edu	Y
Ken Sturm	FWS, Canaan Valley	Ken_Sturm@fws.gov	Y
OBSERVERS & OTHERS			
Paul Hess (M)	FWS, Iroquois	Pwul_Hess@fws.gov	Y
Andy Weick (FWS, Moosehorn	Andy_Weick@fws.gov	Y
Bill Patterson	U Mass	wap@forwild.umass.edu - prescribed fire expert	no
Steve Fuller	NH Game & Fish	steven.g.fuller@wildlife.nh.gov - Karner Blue Butterfly & fire	no
Tony Leger	FWS	Tony_Leger@fws.gov	Y

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13. Brief problem description.

Shrub communities provide critical habitat for regionally declining Neotropical migrants during both the breeding and post breeding season and New England cottontail, a Candidate Species with very limited distribution. Accordingly these habitats have been identified as high priority for many refuges in the Northeast. Shrub communities are also one of the most invaded habitats on most Refuges, and especially in the coastal zone. The ability of non-native invasive plant species to quickly colonize these habitats and their tenacious character, once established, has hampered our ability to meet habitat objectives for our trust resources. Lacking knowledge regarding successful and efficient techniques for managing shrubs with invasive plants or how to create new native shrublands, many biologists and managers choose to maintain the status quo.

Influence Diagram for Shrub System:



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14. Objectives.

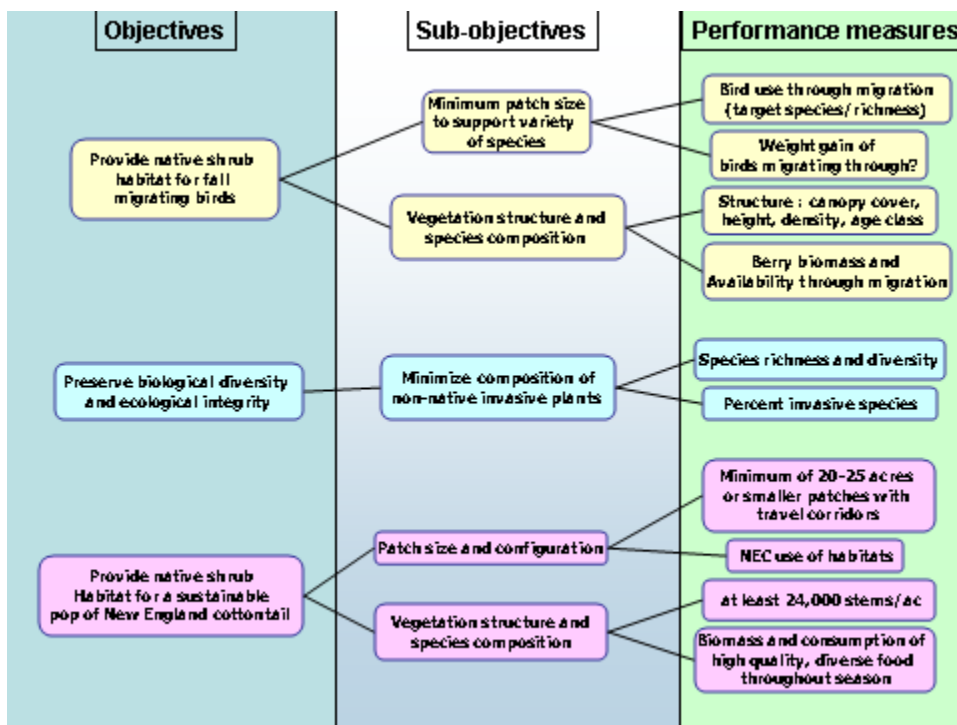
Goals of Adaptive Management Consultancy:

The goal of this consultancy has been to develop a structured decision making framework by which the Refuges can test different management alternatives. Ultimately the objectives of the consultancy are to:

- Identify best management practices for converting grassland to native shrubs.
- Identify best management practices for enhancing a shrub habitat to provide better quality habitat.
- Identify species/habitat relationship and ecological variables that will influence successful implementation of management practices.
- Identify monitoring matrices and develop standardized protocols to evaluate success of management alternatives.

Management Objectives

The following objectives for shrub management were ‘brainstormed’ jointly by Parker River Refuge, Rachel Carson Refuge, Eastern Massachusetts Refuge Complex and Rhode Island Refuge Complex and modeled after regional and Refuge management plans. We included both “end” objectives (the target resources of concern) and “means” or sub-objectives (habitat attributes required by the resources of concern).



Objectives defined in refuge CCP and HMP documents (actual acreage varies from refuge to refuge):

1. Maintain a minimum of 500 acres of maritime shrub and forest habitat with medium to high stem density (>10,000 stems/ha) to provide nesting and feeding habitat for eastern towhee, brown thrasher, prairie warbler, and cover for New England cottontail.
2. Maintain 50-100 acres of native maritime shrub and forest communities (dominated by native fruit-bearing shrubs and trees, including shadbush, black cherry, arrowwood, beach plum, bayberry, and elderberry and comprising less than 5% invasive plants) to benefit fruit-eating migratory landbirds.
3. Convert 50 acres of old field habitat to native shrubland habitat to benefit high priority bird species and New England cottontail.

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15. Management alternatives & expected response of the resource. Who makes decisions about what management actions to implement? When & how often are these decisions made?

Shrub management for the purposes of this consultancy was divided into two scenarios which will be implemented at least twice among the four refuges;

- 1) Converting field or grassland to shrub dominated habitat
- 2) Converting invasive and / or perceived 'low quality' shrub habitat to native and / or 'high quality' shrub habitat.

In addition, each refuge will implement a low intensity and moderate intensity treatment within their designated habitat type(s) to ascertain the effectiveness and necessity of additional investment (in time and / or money) to achieving a successful outcome. Each of the treatment regimes requires more than one season of consecutive treatments before the habitat and wildlife responses will be evaluated. A proposed implementation schedule has been defined at each refuge as follows:

CONVERTING EXISTING GRASSLAND TO SHRUB DOMINATED HABITAT

Treatment	RHC	PKR	GRM	RI
Low intensity: Yr 1: Let go to shrub, foliar application during growing season and/or targeted mowing Yr 2—Yr x: Targeted invasive treatments—spot treatments with Garlon for invasive shrubs only.		x	x	
Medium Intensity: Yr 1: Let go to shrub, foliar application during growing season and/or targeted mow or hand pulling (plant natives at RHC) Yr 2-Yr x: Targeted invasive treatments with herbicides or hand-pulling (RHC); plant natives (broadcast seed, propagate) if necessary.	x		x	

MAINTAINING / ENHANCING EXISTING SHRUB DOMINATED HABITAT

existing shrubs $\leq 25\%$ invasive species

Treatment	RHC	PKR	GRM	RI
Low Intensity: Yr 1: Spot treat (invasive only) with combination of mechanical and chemical Yr 2: monitor for reprints, and retreat as needed. Repeat as necessary.		x		x
Medium Intensity: Yr 1: Selectively treat (invasive / tree / 'over mature') using mechanical (and /or chemical) means. Optional: Dormant season burn to increase stem density. Optional: Transplant shrubs to increase diversity (structural & compositional)	x			x
Control: No management; monitor only	x	x		x

Expected responses are incorporated into the model as probabilities, which are then assigned utility values such that positive responses with minimal management are most highly preferred and ranked, while negative or minimal habitat response following the most intensive management is ranked lowest. Although we have incorporated our expectations in a general sense in the model (through probability 'weights') we are not presuming to be able to predict specific responses in habitat variables (% cover, species composition, berry production) across sites.

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16. Competing models & key uncertainties.

For the purposes of this consultancy we have chosen to compare moderate intensity management treatments to low intensity treatments in two different habitat types that are being actively transitioned to high quality shrub habitats.

17. Decision support & modeling tools.

Eric Lonsdorf and Melinda Knudson will be developing the decision support and modeling tools.

18. Monitoring metrics.

Monitoring metrics were determined by the four participating refuges, incorporating feedback from the consultancy. The following metrics are being developed to assess progress toward meeting objectives for the overall integrity of the habitat at all sites and fall migrating birds and / or New England cottontail as appropriate at each individual refuge. These metrics should also be able to differentiate success between the low intensity and moderate intensity management regimes over time.

1. Species composition - % woody native and % woody non-native invasive.

For % native and % non-native invasive cover we will use relative change between cover categories (i.e. Bran Blanquette).

2. Desired Conditions Index – This index is intended to capture the overall health and integrity of our management units, based on NVCS, or another suitable set of criteria specifically developed for artificially managed shrublands. We need a desired conditions index, (i.e. a vision of what we are trying to restore or manage for) so that we will know specifically what successful shrub management looks like. We want to use absolute value vs. change in state for the index. We will work with Lesley Sneddon to develop a description of our desired conditions index. This will detail which suite of species are appropriate for the location, community structure, perhaps a set of core or high value shrubs we need for success and which species are undesirable and will detract from the overall score.

3. Vertical Density Index – we propose to measure two items here, vertical density cover at < 1.2 meters and > 1.2 meters. We will either calculate a Shannon-Weiner Index or an average cover. We will use a modified robel pole, take digital photos and estimate cover in each block. We plan to have both field estimates of cover and computer generated estimates of cover.

4. Measurement of Berries – we propose to run transects through the treatment areas, record individual species (include non-native invasive and native woody species) and reproductive status (flowers, berries, evidence of past fruiting) during peak fall migration.

5. Stem Counts - Stem counts will be conducted in plots. We will calculate total woody stems by species/total species stems, stems must be over 20 inches tall with a diameter of less than 3 inches. Metric will be number of stems per an acre, with categories < 15,000, 15,000-20,000 and > 20,000.

6. New England cottontail presence or absence. – NEC presence will be determined in Maine by measuring tracks. In Rhode Island, we will need to do DNA analysis from collected pellets. The metric will be change in status (e.g. absence to presence).

7. Priority bird species presence or absence - Rhode Island will be running a fall banding station in shrub habitats and will be able to document presence / absence of high priority species. Although it will be difficult to differentiate between different treatment areas, we will be able to compare use over time as habitats are modified. Additionally, researchers at URI may be comparing overall bird health (body composition) and associated vegetative composition to two other sites in RI. If time and funding permits, other refuges may conduct point count or transect counts to document bird use of sites, but may not implement these surveys until adequate shrub composition is present at the site (i.e. several years at grassland conversion sites).

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19. Time step for updating models.

The model that will be created to evaluate the input variables described above (18) will be designed to provide feedback on management 'success' at three-year intervals. We decided on this time step since it is unlikely that change will be detectable within a shorter time frame. This also allows for implementation of several consecutive management steps as outlined in above (13).

20. Briefly, how will this project improve management at your station & elsewhere?

Lacking knowledge regarding successful and efficient techniques for transitioning field habitats to native shrub habitats, many biologist and managers choose to maintain the status quo and mow existing grassland habitat rather than allow them to transition to shrub and forest habitats that would invariably contain a large percentage of non-native invasive plants.

Management in existing shrub dominated habitats has been focused exclusively on removal of non-native invasive species. Although this should increase the ecological integrity of a site, it is important for us to understand whether these habitats could also be improved with regard to structure and species composition such that they more closely resemble the desired habitat conditions for high priority species.

This postponement of needed management is costly in two ways:

- It ties up limited staff and funds for labor-intensive practices that produce little resource value (e.g. mowing of fields annually to prevent invasion)
- It ties up limited staff and funds on labor-intensive practices that may not provide the most effective improvement to habitat value for trust resources (e.g. removal of invasives without regard to improving native species composition and structural diversity)
- Potential negative impacts to trust resources, including but not limited to:
 - not providing higher value shrub habitat to migratory birds and NEC
 - not increasing acres of a limited habitat for declining Trust Species
 - decreased biological integrity and diversity from increasing invasive composition
 - decreased nutritional value of forage available to migratory birds and NEC as native shrubs shift to invasive shrubs

What is learned on the four refuges included in this consultancy should be applicable to refuges throughout the northeast where they are managing for shrub habitat, especially where priority resources include migratory birds and non-native invasive plant species are of concern.

Section 3. Implementation Plan

21. Monitoring Partners (all Refuge stations and others who will be implementing the plan).

Partner	Agency	E-mail / phone number / notes
Parker River NWR	FWS	Nancy_Pau@fws.gov
Eastern Massachusetts NWR Complex	FWS	Stephanie_Koch@fws.gov
Rachel Carson NWR	FWS	Kate_O'Brien@fws.gov
Rhode Island NWR Complex	FWS	Suzanne_Paton@fws.gov

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22. Timeline for implementation. Estimate when assistance will be needed from modeler, database expert, BMT, or Regional Biologist.

Approx. Date	Task	Responsible Person
February 15 2008	Finalize management alternatives	Refuge Biologists
March 1 2008	Define monitoring metrics	Refuge Biologists
April 1 2008	Finalize monitoring protocols	Refuge Biologists
August 1 2008	Define 'desired condition' classification	Leslie Sneddon w/ Refuge Biologists
Summer 2008	Draft decision support spreadsheet	Eric Lonsdorf
Aug - Oct 2008	Test monitoring protocols / collect pre-management data	Refuge Biologists
Fall 2008	Create monitoring database	Todd Sutherland
Summer 2008	Finalize decision support spreadsheet	Eric Lonsdorf
Fall 2008 - Fall 2009	Implement Management Actions Year 1	Refuge Biologists and Managers
Fall 2009	Implement monitoring protocols annually	Refuge Biologists and Managers
Fall 2009 - Fall 2010	Implement Management Actions Year 2	Refuge Biologists and Managers
Winter 2011-12	Update model to reflect changes in metrics	Eric Lonsdorf or another Modeler

23. Budget.

Total request from Regional Office (FY 08, to include money obligated for work in fall 2008 (FY09)): Station(s) proposed to receive the funds (if multiple stations indicate the budget breakdown by station).

If grants or other funding sources are being used for the project, indicate the sources & amounts (add a column).

Item	Hours	Station \$	Regional Office \$
Parker River NWR			
Year 1 (FY 2008)			\$10,467
Refuge Biologist (consultancy and field work)	240	8,500	
Refuge biological technician (GS 7, consultancy and field work)	100	2,000	
Seasonal employee (GS5, monitoring and treatment)	160		2,467
Biological Intern	80	800	
Habitat Manipulations -contractors			5,000
Equipment rental /supplies			3,000
Year 2 (FY 2009)			\$11,700
Refuge Biologist (data analysis, planning, and field work)	160	5,600	
Biological technician (GS 7) (data analysis and field work)	100	2,000	
Seasonal employee (GS 5) (treatment and monitoring)	240		3,700
Habitat Manipulations—contractors			5,000
Equipment rental/supplies			3,000
Eastern Massachusetts NWR Complex			
Year 1 (FY 2008)			\$12,000
Refuge Biologist (consultancy and field work)	240	7,200	
Seasonal employee (GS5) (monitoring field work)	160	2,467	
Biological intern (monitoring field work)	80	590	
Possibly contract with Joann Hoy for soil work			2,000
Contract with IVM (management/control)			10,000
Equipment and Supplies		1,000	
Year 2 (FY 2009)			\$12,000

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Refuge Biologist (consultancy and field work)	160	4,800	
Seasonal employee (GS5) (monitoring field work)	160	2,467	
Biological intern (monitoring field work)	80	590	
Contract with IVM (management/control)			8,000
Plantings for medium intensity treatment			4,000
Rachel Carson NWR			
Year 1 (FY 2008)			\$10,500
Staffing			
Refuge Biologist (add NEC search time) ?	240	7,200	
Seasonal employee (GS5) monitoring, growing greenhouse stock and treatment planning.	480		7,500
Seasonal interns	160	1,000	
Operations			
Travel			500
Equipment/supplies/greenhouse stock			2,500
Year 2 (FY 2009)			\$12,400
Refuge Biologist (consultancy and field work)	240	7,200	
Seasonal employee (GS5) (monitoring field work, plant stock tending, planting, and hand removal)	640		10,400
Biological intern/YCC (monitoring field work, hand removal)	500	5,000 est.	
Plantings to be grown out for fall planting			2,000
Travel		500.	
Rhode Island NWR Complex			
Year 1 (FY 2008)			\$10,467
Staffing			
Refuge Biologist (consultancy and field work)	240	7,200	
Term employee (GS5) (field work - vegetative monitoring)	160		2,467
Seasonal intern (assist with field work)	240		1,500
Contract for bird banding	320		5,000
Operations			
Travel		500	
Equipment/supplies			1,500
Year 2 (FY 2009)			\$14,300
Staffing			
Refuge Biologist (consultancy and field work)	160	4,800	
Term employee (GS5) (field work - include NEC, bird and vegetative monitoring)	440		6,800
Seasonal intern (assist with field work)	240		1,500
Operations			
Travel		500	
Habitat Manipulations - cut / herbicide	80	1,280	6,000
Total for FY 2008			\$47,400
Project Total Budget for FY 2009			\$50,400

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Section 4. Attachments

24. Please attach the summary or minutes from the workshop. Also attach any proposals for contracts or other requests.

Proposals for contracts:

We've identified several areas where our project would benefit from additional expertise.

1) Shrubland Propagation Advice from Bill Cullina, New England Wildflower Society

Given the Refuge Systems goals are to manage our lands with the optimal ecological integrity, and that some species like New England cottontail need suitable habitat as soon as possible and that in the absence of competitive vegetation, invasive plants are likely to take over, all 4 Refuges would like to explore planting native shrubs as a possible management tool. Propagation of these shrubs versus purchasing from a native plant wholesaler will ensure we are using truly native stock, vs. cultivars and would help keep costs down. Seeds and plants will also be locally adapted, and have local genotypes. We understand propagation may not be possible in all cases, but we need expert advice on purchasing and planting stock which will be competitive and meet our biological objectives.

Scope of Work:

- Expertise on what native plant species will meet our biological goals, yet hold their own against invasive plants.
- A list of plants which would be easy to propagate using cuttings, or seed sowing and a detailed description of how to propagate and plant.
- For Rachel Carson NWR, a review of our greenhouse propagation efforts, advice on overwintering seeds and plants, and technical expertise on which plant species are expected to grow quickly and produce multi-stemmed thickets appropriate for NEC.
- Advice on how to diversify our shrublands.
- Recommendations on site prep, planting time, reducing browse, etc. so that plantings have an optimal chance to colonize.

Budget: \$2,000 total, to be put into a PO and used over 2 years. 38 hours of consulting services

2) Technical Expertise from Lesley Sneddon, Nature Serve

NatureServe proposes to consult with biologists to develop standards of desired shrub conditions based on the NVCS. Ms. Sneddon has already visited Parker River. For this proposal, she will visit Rachel Carson, Great Meadows, and Ninigret refuges and confer with all four refuge biologists to determine appropriate areas for restoration and management. We will refer to existing NVCS maps of the refuges developed under a prior agreement, and further research desired, or target, conditions for shrublands on the four refuges.

Each refuge possesses an NVCS map and descriptions of types at each refuge. However, each NVCS type is described at a "global" level, including species that occur within the type across its full range. We will produce a concise report describing 1) methods; 2) the NVCS association(s) as they currently occur at each refuge, and 3) target composition, structure, and refuge-specific ecological integrity criteria for each association. For all work and project deliverables, NatureServe requests a total of \$10,080.17 (ten thousand eighty dollars and seventeen cents), as detailed in the budget below.

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BUDGET

	Total Cost
I. Salary	
Position	
a. Senior Regional Ecologist	\$3,957
b. Administrative Assistant	\$35
d. Data Manager	\$196
e. Science Operations Manager	\$ 60.96
e. Regional Ecologist	\$ 130.36
Total Labor	\$4,379
Benefits (46.5%)	\$ 2,036.45
Subtotal Salaries	\$6,416
II. Other Direct Costs	
Description	
a. Technology & Data Mgmt	\$ 743.24
b. Travel Expenses	\$221
d. Telecommunications	\$10
Subtotal Other Direct Costs	\$ 974.24
IV. Subtotal	\$ 7,390.15
V. Indirect Costs (36.4%)	\$ 2,690.02
V. TOTAL COSTS	\$ 10,080.17

Scope of Work:

1. Field Reconnaissance
NatureServe's Regional Ecologist will accompany refuge biologists to Rachel Carson, Great Meadows, and Ninigret refuges to identify potential target areas. Field data on current composition, structure, and condition will be examined for each appropriate target area at each site
2. Determine target NVC types, and research desired or target conditions for each type.
NatureServe's Regional Ecologist will collaborate with the refuge biologists to acquire ancillary data such as land use history, and search NatureServe's extensive literature database for pertinent literature.
3. Write desired conditions report

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Using field data, literature, and other data provided by refuge biologists, write a description of each desired type including species composition, structure, and condition. Report will include methods and refuge-specific descriptions.

4. Project Management

The Senior Regional Ecologist will track budgets and conduct other administrative tasks associated with the project.

Deliverables: Project report for Parker River, Rachel Carson, Great Meadows, and Ninigret Refuges including components listed in number (3) above.

Attached: Minutes from January Workshop

Section 5. Instructions

25. After your adaptive management workshop, the workshop recorder will summarize the minutes of the workshop and distribute to all interested persons (participants, partners, managers). The planning team will meet to finalize any items not completed during the workshop. These include refining the descriptions of the alternative management actions and defining the monitoring metrics and how they will be interpreted. The planning team or representatives will meet with the modeler to work out details of drafting a decision support tool (spreadsheet). The planning team also needs to estimate when they need help creating a project database to hold the monitoring data. If the services of a contractor are needed (specialized expertise or reviews), solicit needed contracts.

The planning team will draft this Implementation Plan & discuss the plan with the Project Leaders (PL) at each station proposing to implement. The Team Leader will finalize the Implementation Plan and forward to the Regional Biologist (RB), with cc to the PL. The PL will e-mail the RB to indicate their concurrence with the Plan. (Alternatively, send a hard copy with PL signature to the RB; the RB still needs the digital file.) The Regional Office will determine whether or not additional funds are available to support implementation of the project. A revised plan with updated budget should be submitted on or before 1 March each year that the project is operational if Regional Office funding is desired. Projects should be designed to be feasible with or without this funding.